HATCHERY EVALUATION REPORT

LYONS FERRY HATCHERY - FALL CHINOOK

An Independent Audit Based on Integrated Hatchery Operations Team (IHOT) Performance Measures

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Prepared for:

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Executive Summary

This report presents the findings of the independent audit of the Lyons Ferry Hatchery (Fall Chinook). Lyons Ferry Hatchery is located downstream of the confluence of the Palouse and Snake rivers, about 7 miles west of Starbuck, Washington. The hatchery is used for adult collection of fall chinook and summer steelhead, egg incubation of fall chinook, spring chinook, steelhead, and rainbow trout and rearing of fall chinook, spring chinook, summer steelhead, and rainbow trout.

The audit was conducted in April 1996 as part of a two-year effort that will include 67 hatcheries and satellite facilities located on the Columbia and Snake River system in Idaho, Oregon, and Washington. The hatchery operating agencies include the U.S Fish and Wildlife Service, Idaho Department of Fish and Game, Oregon Department of Fish and Wildlife, and Washington Department of Fish and Wildlife.

Background

The audit is being conducted as a requirement of the Northwest Power Planning Council (NPPC) ÒStrategy for SalmonÓ and the Columbia River Basin Fish and Wildlife Program. Under the audit, the hatcheries are evaluated against policies and related performance measures developed by the Integrated Hatchery Operations Team (IHOT). IHOT is a multi-agency group established by the NPPC to direct the development of new basinwide standards for managing and operating

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fish hatcheries. The Bonneville Power Administration (BPA) contracted with Montgomery Watson to act as an independent contractor for the audit.

IHOT has established five basic policies that cover: (1) hatchery coordination, (2) hatchery performance standards, (3) fish health, (4) ecological interaction, and (5) genetics. The audit focuses on all these policies, with the exception of hatchery coordination. These policies are set forth in *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (IHOT 1995)*. That document is the source for the performance measures that are the basis of this audit.

The Audit Process

The audit was based on the facility managementÕs response to a 98-page questionnaire. This audit form was completed through a five-step process in which:

- Information was obtained from headquarters sources
- The hatchery manager was asked to fill out and return the audit form
- A 1-2 day site audit inspection visit was conducted to inspect facilities, review hatchery records, discuss audit form responses, and develop remedial action plans
- A compliance report was developed to document the compliance status of each
 performance measure. This report was then shared with the hatchery manager and
 IHOT representative.

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This hatchery evaluation report was written to document compliance with IHOT
performance measures and develop cost estimates for remedial actions when needed.

Lyons Ferry Hatchery (Fall Chinook) Audit Results

The Lyons Ferry facility includes 4 raceways for adult holding, 47 raceways and 3 earthen ponds for rearing, incubation facilities, and 4 satellite facilities. Lyons Ferry Hatchery was constructed under the Lower Snake River Compensation Program as partial mitigation for federal dams constructed on the lower Snake River. The hatchery started operation in 1984.

The hatchery was in general compliance with most of the performance measures. In the facilities requirements area, the audit found that the hatchery needed a chiller for incubation and some modifications to the release structure. The audit found that the hatchery did not have information on some of the water chemistry and contaminant parameters. In the area of genetics policy, the hatchery did not have a written broodstock collection plan or a Genetics Monitoring and Evaluation Program in place.

The specific areas in which the Lyons Ferry Hatchery (Fall Chinook Program) requires remedial actions based on the IHOT performance measures are listed below. These remedial actions are listed in order of occurrence on the questionnaire without intent of ranking or otherwise assigning priority:

- Chiller for incubation
- Monitor total gas pressure and dissolved oxygen
- Monitor water chemistry parameters on routine basis
- Monitor water contaminants on routine basis
- Modification to release structure to allow removal of safety rack

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- Regional quality control officer to oversee production procedures and monitor feed quality
- Need to measure smoltification
- Conflict between WDFW and IHOT disinfection policies
- Reduction of DO to 8 ppm after transport system is functioning properly
- Develop broodstock collection plan for IHOT Operations Plan
- Develop genetics monitoring and evaluation plan for IHOT Operations Plan

Non-compliance issues resulting from items beyond human control or Performance Measures not relevant to this hatchery (Type 1 in Table 2, Section 4) were not listed above.

Facility Description

Name: Lyons Ferry Hatchery

Stock/Species: Fall Chinook, Spring Chinook, and Summer Steelhead

Operating Agency: Washington Department of Fish and Wildlife

Funding Agency: U.S. Fish & Wildlife Service

Location: Lyons Ferry Hatchery is located downstream of the confluence of the

Palouse and Snake rivers, about 7 miles west of Starbuck, Washington

at an elevation of 526 feet above sea level.

Address: Lyons Ferry Hatchery

Washington Department of Fish and Wildlife

Box 278

Starbuck, WA 99359

Complex Manager: Mr. Butch Harty **Phone** (509) 646-3454

Fax: (509) 646-3400

Purpose: Lyons Ferry Hatchery was constructed under the Lower Snake River

Compensation Program as partial mitigation for federal dams

constructed on the lower Snake River. The hatchery started operation

in 1984.

The purpose of the Fall Chinook program is to provide fish for the

ocean and river fisheries.

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Fall Chinook

800,000 smolts (8/lb) for on-station release

Spring Chinook

132,000 fingerling (35/lb) for transfer to Tucannon Hatchery for final rearing and acclimation

Summer Steelhead

931,200 smolts (4-8/lb) for on-station and for release from satellite facilities

Rainbow Trout

353,000 legal sized fish and 200,00 sub-legal fish (108,000 lb)

Total Production: 423,800 lb (average of 1993-5)

Water Supply:

Water is supplied to the hatchery from wells. No river water is currently being used.

Facilities:

Incubation:

112 16-stack vertical tray

88 shallow troughs

4 deep tanks

Adult Holding 4 raceways, 11,800 cf each

Raceways 28 raceways, 3,000 cf each

19 raceways, 3220 cf each

Rearing Ponds 3 earthen ponds, 675,000 cf each (these ponds are commonly called the

ÒlakesÓ)

Satellite Facilities Tucannon Hatchery (Spring Chinook, trout, and Steelhead programs)

Curl Lake Rearing Pond (Steelhead program)

Cottonwood Rearing Pond (Steelhead program)

Dayton Rearing Pond (Steelhead program)

Compliance Status

The hatchery audits are based on compliance with written IHOT performance measures. These performance measures are documented in *Policies and Procedures for Columbia Basin*Anadromous Salmonid Hatcheries (referred to as IHOT 1995 in this report).

The purpose of the performance measures is to implement new basinwide policies that provide regional guidelines for operating anadromous hatcheries in the Columbia Basin.

The audit focuses on performance measures for IHOT policies that cover (1) hatchery performance standards, (2) fish health, (3) ecological interaction, and (4) genetics. These performance measures are intended to guide hatchery operations once production is established. For that reason, the hatchery operations audited included broodstock collection, spawning, incubation of eggs, fish rearing and feeding, fish release, equipment maintenance and operations, and personnel training. Production priorities are beyond the scope of this audit.

Based on *IHOT 1995*, a detailed 98 page audit form was developed. The audit form divided the performance measures into six major sections along major program and technical criteria areas. Section 7 includes general information needed for the audit:

Section 1 Performance Measures for Program Objectives (PMs 1-4)

Section 2 Performance Measures for Facility Requirements (PMs 5-15)

Integrated Hatchery Operations Team (IHOT) 1995. *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries*, Bonneville Power Administration, Portland, Oregon.

Section 3 Performance Measures for Hatchery Practices (PMs 16-25)

Section 4 Performance Measures for Fish Health Policy (PMs 26-34)

Section 5 Performance Measures for Ecological Interactions (PMs 35-38)

Section 6 Performance Measures for Genetics Policy (PMs 39-43)

Section 7 Performance Measures for General Information (PMs General 1-2)

Several performance measures are repeated in various sections of the audit. These performance measures overlap in *IHOT 1995* and were retained to allow individuals interested in specific portions of the audit (such as Genetics or Fish Health) to determine the compliance status of all performance measures for a given topic in one location. A repeated performance measure is indicated by light gray shading.

The Hatchery Audit Process

The hatchery audit will be conducted over a two-year period that concludes in 1997. This report covers phase one of the audit, which consists of an audit of four hatcheries and seven species or stocks of fish. At each hatchery, a five-step process was used to complete the overall hatchery audit. This process consisted of research and on-site visits. The site visits were conducted from March 4 to March 8.

The following is the five step audit process:

- 1. Information was obtained from headquarters sources.
- 2. The hatchery manager was asked to fill out and return the **Audit Form**.

- 3. A 1-2 day site audit inspection visit was conducted at each hatchery. During that visit an audit team inspected facilities, reviewed hatchery records, discussed audit form responses, and developed remedial action plans when appropriate.
- 4. A Compliance Report was developed to document the compliance status of each performance measure. During the site visit, the compliance status of each performance measure was discussed with the hatchery manager and IHOT representative.
- 5. This information was used to develop a draft **Hatchery Evaluation Report.**Based on review and comments of this prototype document, a final Hatchery
 Evaluation Report was developed. The final report documents the compliance of
 a particular hatchery with the IHOT performance measures and presents cost
 estimates to correct any deficiencies.

Compliance Status of Lyons Ferry Hatchery (Fall Chinook)

This section documents the compliance status of the Lyons Ferry Hatchery (Fall Chinook). Each performance measure is presented in a table taken from the audit form (Table 1). The compliance status is identified by the following categories:

- N/A (not applicable)
- Yes (in compliance)
- ? (unknown; generally due to unavailability of information to determine compliance)
- **No** (not in compliance).

Remedial actions are suggested for performance measures not in compliance. These remedial actions are grouped into categories and listed in Section 4, where the cost of the required remedial actions is also presented.

 Table 1
 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook) With Performance Measures

Description of Performance Measure	Desci		Description of Performance Measure	Compliance Status		us	Basis for Compliance or	Remedial Action Needed for	
							Non-Compliance	Compliance	
				N/A	Yes	?	No		
Are the hatchery programs outlined in a	the ha	Aı	Are the hatchery programs outlined in a						
subbasin management plan?	asin 1	su	subbasin management plan?		4			Lower Snake River Compensation	
								Plan & U.S. vs. Oregon	
Is the hatchery operating under a current	e hato	Is	Is the hatchery operating under a current						
hatchery operational plan?	hery (ha	natchery operational plan?		4			Review of IHOT Operational Plan	
Is it understood by staff?	Is i		Is it understood by staff?		4			Discussion	
Is it being followed?	Is i		Is it being followed?		4			Discussion	
Is a hatchery monitoring and evaluation plan	hatch	Is	s a hatchery monitoring and evaluation plan						
in place?	ace?	in	n place?		4			5-Year Plan & Annual Reports	
Specific performance measures include:	ific p	Sp	Specific performance measures include:						
Adult contribution to fisheries, spawning	lt con	Ac	Adult contribution to fisheries, spawning						
grounds and hatchery	nds a	gr	grounds and hatchery		4			Review of records/Discussion	
					4			Review of records/Discussion	

Table 1 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook) With Performance Measures

		N/A	Yes	?	No		
#4b	Adult pre-spawning survival as compared with established goal		4			Review of records	
#4c	Egg-take as compared with established hatchery goal				4	0 years out of 5 in compliance	None; rebuilding run
#4d	Green-egg-to-eyed-egg survival as compared with established goal	4				No goal listed in Operation Plan	
#4e	Eyed-egg to fry survival as compared with established goal	4				No goal listed in Operation Plan	
#4f	Fry-to-smolt survival as compared with established goal		4			Review of records/Discussion	
#4g	Production as compared with established goal				4	0 out of 5 years in compliance	Need better returns

Table 1 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook) With Performance Measures

		N/A	Yes	?	No		
#4	Percent survival (smolt to adult) as compared						
	with established goal				4	0 out of 5 years in compliance	Need better returns
#4	Number of eggs, fry, fingerlings, smolts and/or						
	adults to meet basinwide needs	4					

 Table 1
 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook)
 With Performance Measures

PM #	Description of Performance Measure	Co	Compliance Status		tus	Basis for Compliance or	Remedial Action Needed for
				I		Non-Compliance	Compliance
		N/A	Yes	?	No		
#5	Water quality						
#5a	Temperature						
	Do your water temperatures meet the criteria for spawning?		4			Review of records/Discussion	
	Do your water temperatures meet the criteria for incubation?		4			ò ò	Need chiller to control development: 150 gpm @ÆT= - 10¡F
	Do your water temperatures meet the criteria for rearing?		4				

 Table 1
 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook)
 With Performance Measures

		N/A	Yes	?	No		
#5b	Dissolved gases						
	Is the oxygen level near saturation?			4		No data provided	Monitor total gas pressure (TGP) and dissolved oxygen (DO)
	Is the dissolved nitrogen level less than			4		No data provided	
	saturation?						
#5c	Chemistry						
	Ammonia (un-ionized)			4		No data	Run analysis
	Carbon Dioxide			4		No data	Run analysis
	Chlorine			4		No data	Run analysis
	рН			4		No data	Run analysis
	Copper				4	Limited data	Run analysis to confirm
	Hydrogen Sulfide			4		No data	Run analysis
	Iron				4	Limited data	Run analysis to confirm
	Zinc		4				

 Table 1
 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook)
 With Performance Measures

		N/A	Yes	?	No	
#5d	Turbidity					
	Does your turbidity meet the criteria?		4			Groundwater supply; not a problem
#5e	Alkalinity and hardness					
	Does your alkalinity and hardness meet the criteria?		4			Review records
#5f	Nitrite					
	Does your nitrite meet the criteria?		4			Review records

 Table 1
 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook)
 With Performance Measures

		N/A	Yes	?	No		
#5g	Contaminants						
	Aldrin			4		No data	Run analysis
	Endrin			4		No data	Run analysis
	Dieldrin			4		No data	Run analysis
	Heptachlor			4		No data	Run analysis
	Chlordane			4		No data	Run analysis
	Methoxychlor			4		No data	Run analysis
	Lindane			4		No data	Run analysis
	Malathion			4		No data	Run analysis
	Guthion			4		No data	Run analysis

 Table 1
 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook)
 With Performance Measures

		N/A	Yes	?	No		
#5h	Pathogens						
	What portions of the hatchery have disease-						
	free water?						
	Adult holding?		4			Groundwater supply	
	Incubation?		4				
	Early rearing?		4				
	Rearing?		4				
	Acclimation ponds?				4	Use surface water	

Table 1 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook) With Performance Measures

		N/A	Yes	?	No		
#6	Alarm Systems						
	Do the following areas have alarms?						
	Intake?		4			Inspection/Discussion	
	Large rearing ponds and adult holding		4			òòò	
	ponds?		4				
	Raceway headboxes and rearing ponds?		4				
	Incubation facilities?	4					
	Quarantine areas and facilities?	4					
	Water treatment systems?		4			Discussion	
	Security?						
			4			Discussion	
	Are there outside systems and buzzers in on-						
	site residences?						
			4			Some checked daily	Need more frequent checking
	Are water flow alarms checked daily?		7				
			4			Discussion	
	Are all other alarms checked weekly?		4				

Table 1 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook) With Performance Measures

		N/A	Yes	?	No	
#7	Adult collection and holding facilities					
	Do you meet the adult holding criteria?		4			Review of records/Discussion
#8	Incubation facilities					
	Type 1: Vertical Tray Do you have an adequate number of units for the overall program?		4			Inspection of facilities/Discussion

 Table 1
 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook)
 With Performance Measures

		N/A	Yes	?	No		
#9	Rearing facilities						
	Type 1: Raceways Do you have an adequate number of units for the overall program?		4			Inspection of facilities/Discussion	
	Type 2: Lakes Do you have an adequate number of units for the overall program?		4			Inspection of facilities/Discussion	
	Type 3: Adult Holding Ponds Do you have an adequate number of units for the overall program?		4			Inspection of facilities/Discussion	Release structure needs modification: safety rack over outlet pipe needs to be removable

 Table 1
 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook)
 With Performance Measures

		N/A	Yes	?	No	
#10	Screening facilities					
	Do you meet the approach velocity criteria:	4				Groundwater supply; not
						applicable
	Are the fish screens regularly cleaned?	4				
						Groundwater supply; not
	Are rearing containers double screened for	4				applicable
	fish that should not be released to adjacent					
	water?					Released on-site
#11	Predator control facilities					
	Are your predation control facilities		4			Inspection of facilities/Discussion
	effective?					

 Table 1
 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook)
 With Performance Measures

	1		[T		1	
#12	Food storage facilities and quality control	N/A	Yes	?	No			
. 	2 000 storage memores and quality control							
	Does the storage of dry/semi-moist/moist							
	foods follow food manufacturerÕs							
	recommendations? (dry<12%; semi-moist 12-							
	20%; moist >20% moisture)							
	Does a regional quality control officer							
	oversee production procedures and monitor:							
	Verification by feed manufacturer that							
	ingredients meet specifications?							
	Ensure feeds do not contain unwanted							
	drugs or other additives?							
	Analyze ingredients contained in the final							
	food product to ensure that feed							
		=						

 Table 1
 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook)
 With Performance Measures

	N/A	Yes	?	No		
		4			Discussion	
				4	Discussion	This should be addressed at State
						or regional level; not hatchery
						responsibility
				4	Discussion	
				4	Discussion	
				,		

 Table 1
 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook)
 With Performance Measures

		N/A	Yes	?	No		
#13	Release facilities Do the release facilities ensure that fish are not subjected to adverse conditions?		4			Inspection of facilities/Discussion	
#14	Pollution abatement facilities Do the pollution abatement facilities meet all federal and state regulations (or good engineering practice)?		4			Inspection of facilities/Discussion	
	Are pollution abatement facilities operated correctly?		4			Discussion	

 Table 1
 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook)
 With Performance Measures

		N/A	Yes	?	No		
#15	Transportation facilities						
			,			5	
	Are the transport systems adequate to meet		4			Discussion	
	IHOT performance measures for						
	transportation practices?						
	transportation practices:						

 Table 1
 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook)
 With Performance Measures

PM #	Description of Performance Measure	Co	omplian	ice Stat	tus	Basis for Compliance or	Remedial Action Needed for
						Non-Compliance	Compliance
		N/A	Yes	?	No		
#16	Broodstock selection practices Is the donor selection process document attached?	4				Existing Program; does not apply	
	Was the donor selection outline followed in selecting the hatchery broodstock?	4				Existing Program; does not apply	
#17	Go to PM #40 in Genetics Spawning practices Were the appropriate number of spawners, male/female ratios, and fertilization protocols used? Go to PM #42 in Genetics Section		4			Review of records/Discussion	

Table 1 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook) With Performance Measures

	N/A	Yes	?	No		
Incubation practices						
Are specific incubation standards listed in the hatchery operations plan?		4			In hatchery Operations Plan	Include in IHOT Operations Plan
Are incubation practices written?		4			In hatchery Operations Plan	
Incubation Type 1: Vertical Tray See PM #8) Do you meet the loading and flow criteria?		4			Review of records/Discussion	
	Are specific incubation standards listed in the hatchery operations plan? Are incubation practices written? Incubation Type 1: Vertical Tray See PM #8) Do you meet the loading and flow	Are specific incubation standards listed in the hatchery operations plan? Are incubation practices written? Incubation Type 1: Vertical Tray See PM #8) Do you meet the loading and flow	Are specific incubation standards listed in the hatchery operations plan? Are incubation practices written? 4 Incubation Type 1: Vertical Tray See PM #8) Do you meet the loading and flow	Are specific incubation standards listed in the hatchery operations plan? Are incubation practices written? 4 Incubation Type 1: Vertical Tray See PM 4 #8) Do you meet the loading and flow	Are specific incubation standards listed in the hatchery operations plan? Are incubation practices written? 4 Incubation Type 1: Vertical Tray See PM #8) Do you meet the loading and flow	Are specific incubation standards listed in the hatchery operations plan? Are incubation practices written? Are incubation Type 1: Vertical Tray See PM #8) Do you meet the loading and flow In hatchery Operations Plan Review of records/Discussion

 Table 1
 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook)
 With Performance Measures

		N/A	Yes	?	No		
#19	Rearing practices						
	Are specific rearing standards listed in the		4			In hatchery Operations Plan	Include in IHOT Operations Plan
	hatchery operations plan?						
	Are rearing practices written?		4			In hatchery Operations Plan	
	Are rearing practices written:		4			in nationary operations runn	
	Rearing Unit Type 1: Raceways (see PM						
	9)						
					4	Exceed density and DI criteria at	Should not be a problem in future
	Do you meet the density and DI criteria?					end of production cycle	given the availability of lakes after
							consolidation of the two
						Exceed loading and FI criteria at	departments
	Do you meet the Loading and FI criteria?				4	end of production cycle	
#20	Smolt quality						
	Do you produce a high quality smolt?		4			Discussion	

Table 1 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook) With Performance Measures

		N/A	Yes	?	No			
#21	Fish health management practices		•					<u> </u>
	Are the monthly hatchery monitoring visits							
	being conducted? (PM #26)							
	being conducted: (1 141 #20)							
	Are the annual broodstock inspections being							
	conducted? (PM #27							
	Is there pathogen-free water and are the							
	sanitation procedures being followed? (PM							
	#28)							
	Anothe fellowing western avality managestons							
	Are the following water quality parameters							
	within criteria? (PM #5a-5h)							
	Water temperature							
	Dissolved gases							
	Chemistry							

Table 1 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook) With Performance Measures

	N/A	Yes	?	No	
		4			Review of records/Discussion
		4			Review of records/Discussion
		4			Review of records/Discussion
		4			
					Review of records
		4	4		Review of records
				4	
		4	4	4	No data available for many
		4			parameters

Table 1 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook) With Performance Measures

	N/A	Yes ?	No	
				Monitor total gas pressure (TGP)
				and dissolved oxygen (DO)
				Run analysis

 Table 1
 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook)
 With Performance Measures

N/A Yes ? No	

Table 1 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook) With Performance Measures

		N/A	Yes	?	No		
#22a	Does hatchery performance meet						
	requirements outlined in the regional hatchery						
	policies and in subbasin and hatchery plans						
	for the following areas:						
#22a1							
	Percent smoltification						
	Do you measure percent smoltification?				4	Discussion	Need to monitor smoltification
	Did you meet the smoltification criteria?	4				No goal found	
#22a2	Rearing density (prior to release)						
	Did you meet the rearing density criteria just prior to release?					Review of records/Discussion	

 Table 1
 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook)
 With Performance Measures

		N/A	Yes	?	No		
#22a3	Disease condition (at release) Did you meet all disease regulations just prior to release?		4			Review of records/Discussion	
#22a4	Number (at release)						
	Did you meet the release number goal?		4			Review of records	Need better adult returns
#22a5	Size at release						
	Did you meet the size goal?				4	In compliance 1 out of last 2 years	Need chillers for incubation
#22a6	Dates of release						
	Did you meet the release date goal?				4	Review records/Discussion	

Table 1 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook) With Performance Measures

		N/A	Yes	?	No	
#22a7	Location of release Did you the release the fish at the specified location?		4			Review/Discussion
#22b	Are fish reared in the subbasin or acclimated					
	in the subbasin?					
	Are the fish reared in the subbasin?		4			Discussion
	Are the fish acclimated in the subbasin?		4			Discussion
#22c	Is the release strategy appropriate for the program?		4			Discussion

Table 1 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook) With Performance Measures

		N/A	Yes	?	ı	No	No.	No.	No.	No.	No.	No.	No	No.
#23	Transportation facilities	1 1/1 1	103	•	110	T								
	Do transportation equipment and personnel													
	receive disinfection before and after use?													
	Disinfersion of fight and interior													
	Disinfection of fish tank interior using a solution of 200 ppm active chlorine for 30													
	minutes minimum or formaldehyde gas													
	generation method (relative humidity of 60%													
	for 2 hrs)?													
	Disinfection of fish transport vehicle exterior													
	using high pressure steam (115-130°C), high													
	temperature acid, or with 200 ppm chlorine													
	for 30 minutes?													
	Disinfection of fish transport vehicle (cab)													
	using 600 ppm quaternary ammonia	_												

Table 1 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook) With Performance Measures

	N/A	Yes	?	No		
		4			Discussion	
				4	WDFW policy is 10 minutes	Conflicting policies; change WDFW policy or IHOT policy
		4			Discussion	
		4			Not every time	Increase frequency of cleaning

Table 1 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook) With Performance Measures

	N/A	Yes	?	No		
#23	Transportation facilities	_				
(cont)						
	Does a pre-loading inspection covering the					
	following: tank water level, pumps or aerators,					
	oxygen injection system settings, displacement					
	gauge, and truck loading/hauling density tables					
	checked and reviewed occur prior to loading					
	the fish in the transport unit?					
	Do hauling criteria include checking the fish					
	45 minutes to 1 hour after loading occur?					
	When fish are active and systems are					
	functioning properly, is the oxygen					
	concentration reduced and maintained					
	approximately 8 ppm?					
	Is water temperature in the transportation unit					
	maintained within 42-48°F range?					

 Table 1
 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook)
 With Performance Measures

	N/A	Yes	?	No		
		4			Discussion	
					Discussion	
		4			Discussion	
		4			TT	
					Uncertain	
			4			
				4	Fish are hauled in 51 - 53;F water,	
					which is the temperature of the	

 Table 1
 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook)
 With Performance Measures

	N/A	Yes	?	No	
 •					
					Modify procedures if necessary
					None
					None

Table 1 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook) With Performance Measures

		No	?	Yes	N/A	
						#24 Evaluation practices
						Has the hatchery conducted fishery
						contribution studies to:
	Discussion with hatchery staff &			4		Determine the requirements for
	evaluation biologists					evaluating and improving management
						programs?
	Ò			4		
	Ò					December of deliver that the the
	O					Develop guidelines that define the
						geographical area and identify component
						stocks (hatchery and/or wild) that
						comprise the management unit?
				4		
				4		Davalon guidalines that define if the
						proper stocks of fish are currently being
				4		used?
				4		Develop guidelines that define if the proper stocks of fish are currently being used?

Table 1 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook) With Performance Measures

	N/A Yes ? No
#25	Training practices
	Does the hatchery have a training schedule
	for its staff?
	Does each staff member have a personal
	training plan approved by a supervisor and
	reviewed annually?
	Does the hatchery routinely exchange training
	details between other hatcheries and
	agencies?
	Does the hatchery encourage and reward off-
	duty training of staff?
	Does the hatchery conduct monthly staff
	meetings?
	moungs:

 Table 1
 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook)
 With Performance Measures

	N/A	Yes	?	No		
		4			Discussion	
		4			Discussion	
		4			Discussion	
		4				
		4			Discussion	
					Discussion	
		4				

Table 1 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook) With Performance Measures

PM #	Description of Performance Measure	Co	omplia	ice Sta	tus	Basis for Compliance or	Remedial Action Needed for
						Non-Compliance	Compliance
		N/A	Yes	?	No		
#26	Are monthly hatchery monitoring visits being						
	conducted by a qualified fish health specialist?		4			Review of records/Discussion	
#27	Are all of the functions of the hatchery yearly						
	monitoring visits being completed as described		4			Review of records/Discussion	
	below?						
#28	Is the hatchery following accepted sanitation						
	procedures?						
	Are there any sources of pathogen-free water, especially for incubation and early rearing?		4			Groundwater supply	
	Are the hatchery sanitation procedures understood and being followed?		4			Inspection of facilities/Discussion	

 Table 1
 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook)
 With Performance Measures

		N/A	Yes	?	No		
#29	Are water quality parameters being followed?						
	Are the following water quality parameters						
	within criteria? (PM #5a-5h)						
	(=						
	Water temperature						
	water temperature						
	Dissolved gases		4			Review of records	
	Chemistry			4		No data	Monitor TGP and DO
	Turbidity		4	4	4	No data for many parameters	Run analysis
	Alkalinity and hardness		4			Review of records	
	Nitrite		4			Review of records	
	Contaminants		4			Review of records	
				4		No data	Run analysis
	Go to PM #21						

Table 1 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook) With Performance Measures

		N/A	Yes	?	No		
#30	Are incubation and rearing standards being						
	followed?						
	Are the incubation practices being following the IHOT incubation criteria? (PM #18)		4			Review of records/Discussion	
	Are the rearing practices following the IHOT criteria? (see PM #19)				4	Review of records/Discussion	Should not be a problem in future given the availability of lakes after consolidation of
	Go to Rearing practices, PM #18-PM #19						
#31	Are egg and fish transfer/release requirements met?			4		Discussion	

Table 1 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook) With Performance Measures

PM #	Description of Performance Measure	Co	mpliar	ice Stat	tus	Basis for Compliance or	Remedial Action Needed for
						Non-Compliance	Compliance
		N/A	Yes	?	No		
#32	Is the hatchery's program outlined in a						
	subbasin management plan?		4			Lower Snake River Compensation	
						Plan & U.S. vs. Oregon	
	C . 11 ' 1 DM ! 1					C	
	Go to subbasin plan, PM # 1						
1122							
#33	Is the hatchery operating under a current						
	hatchery operational plan?		4			Review of IHOT Hatchery	
						Operations Plan /Discussion	
	Go to operational plan, PM # 2						
	1 1 /						
#34	Is a hatchery monitoring and evaluation plan						
	in place?		4			Review of Monitoring and	
	in place.		·				
						Evaluation Plan/Discussion	
	Go to hatchery monitoring and evaluation plan						
	PM # 3						

Table 1 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook) With Performance Measures

		N/A	Yes	?	No		
#35	Does the hatchery program meet						
	requirements established in the regional						
	hatchery policies and subbasin planning						
	documents in the following areas: species,						
	stock, broodstock collection location,						
	broodstock numbers, broodstock collection						
	strategy, and spawning and egg-take						
	protocols.						
	Does the hatchery program meet the						
	requirements for the following: (PM #1-PM		4			Review of records/Discussion	
	#2)						
			4			Review of records/Discussion	
	Species protocols? (PM #4a)						
			4			Review of records/Discussion	
	Stock protocols? (PM #4a)						
			4			Review of records/Discussion	
	Broodstock collection location protocols?						

Table 1 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook) With Performance Measures

		N/A	Yes	?	No		
#36	Does the hatchery's performance meet						
	requirements outlined in the regional hatchery						
	policies and in subbasin and hatchery plans						
	for the following areas: percent						
	smoltification, rearing density, disease						
	condition, and the number, size date(s), and						
	location at release.						
	Percent smoltification (PM #22a1)	4				No goal found	
	Rearing density (PM #22a2)		4			Review of records/Discussion	
	Disease condition (PM #22a3)		4			Review of records/Discussion	
	Number at release (PM #22a4)				4	Review of records/Discussion	
	Size at release (PM #22a5)				4	Review of records/Discussion	

Table 1 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook) With Performance Measures

	N/A Yes	? No	
•		_	
			Need better adult returns
			Need chiller for incubator

Table 1 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook) With Performance Measures

		N/A	Yes	?	No		
#37	Are fish reared in the subbasin or acclimated						
	in the subbasin?		4			Review of records/Discussion	
	See PM #22b						
#38	Is the release strategy appropriate for the						
	program?		4			Discussion	
	See PM #22c						

Table 1 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook) With Performance Measures

PM #	Description of Performance Measure	Compliance Status	Basis for Compliance or	Remedial Action Needed for
			Non-Compliance	Compliance

 Table 1
 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook)
 With Performance Measures

	N	'A	Yes	?	No			
#39	For new programs, has a broodstock						•	
	collection plan been developed?							
	Is the broodstock collection plan written?							
	For a non-captive broodstock program:							
	Was an unbiased, representative sample collected?							
	Was the recommended number of broodstock collected?							
	For a captive broodstock program:							
	Were captive brood progeny excluded as donors for propagating the next generation of the captive broodstock							

 Table 1
 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook)
 With Performance Measures

	N/A	Yes	?	No		
	4				Existing program; does not apply	
	4				Existing program; does not apply	
	4				Existing program; does not apply	
	4				Existing program; does not apply	

 Table 1
 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook)
 With Performance Measures

		N/A	Yes	?	No		
#40	For a new program, was the donor selection						
	outline followed in selecting the hatchery						
	broodstock?						
	Is a donor selection plan written?						
	Was the donor selection outline followed in	4				Existing program; does not apply	
	the selecting the broodstock?						
	Was the target stock recommended in the	4				Existing program; does not apply	
	donor selection process actually used?						
		4				Existing program; does not apply	

 Table 1
 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook)
 With Performance Measures

		N/A	Yes	?	No	
#41	For existing programs, were the broodstock					
	collection procedures followed?					
	Is the broodstock collection plan written?				4	None provided to inspection team; a fall chinook management plan
	Does the broodstock collection plan follow					will be completed by December
	the guideline:					1996
	Was an unbiased, representative sample collected?		4			
	Was the recommended number of		4			Discussion
	broodstock collected?					
	Were the broodstock collection procedures		4			Discussion
	in hatchery operation plan understood and		'			
	followed?					
						Discussion

 Table 1
 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook)
 With Performance Measures

	N/A	Yes	?	No	
 •	1	•			
					Develop plan for IHOT
					Operational Plan

 Table 1
 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook)
 With Performance Measures

		N/A	Yes	?	No		
#42	Were the appropriate number of spawners,						
	male/female ratios, and fertilization protocols						
	used?						
	Are the spawning protocols written?		4			Review of hatchery documents	
	Are daily or weekly spawning logs available?		4			Review of records/ Discussion	
	Were the appropriate number of spawners		4			Review of records/ Discussion	
	used?						
			4			Review of records/ Discussion	
	Did you attempt to spawn all collected						
	broodstock and randomize mating with						
	respect to age class, and other traits?						
			4			Review of records/ Discussion	
	Was the sex-ratio within the limits given in		,				
	the performance standards?						
			4			Review of records/ Discussion	

 Table 1
 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook)
 With Performance Measures

	N/A	Yes	?	No	
					Include in IHOT Operational Plan

 Table 1
 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook) With Performance Measures

	N/A Yes ? No
#43	Is there a genetics monitoring and evaluation
	program in place?
	Is a genetics monitoring and evaluation
	program available?
	Does the plan address the following elements
	listed in IHOT:
	Does the program have elements needed
	to meet evaluation goals 1-4?
	Has a qualified geneticist reviewed and
	endorsed the program (goal 5)?
	endorsed the program (goal 2).
	Will the program collect the data and
	maintain the records needed to evaluate
	compliance on an ongoing basis (goal 5)?

 Table 1
 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook)
 With Performance Measures

	N/A	Yes	?	No		
				4	None provided to inspection team; collection of baseline samples is being done	Develop plan for IHOT Operational Plan
	4					
	4					
	4					

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 Table 1
 Lyons Ferry Hatchery Hatchery Compliance (Fall Chinook)
 With Performance Measures

Section 6 Performance Measures for Genetics Policy

Remedial Actions

Based on the compliance status for each performance measure, remedial actions were developed. The required remedial actions are organized into five categories. The types of categories range across a spectrum from those actions that are beyond human control to those that require a change in agency policy or procedures to those that have a significant capital cost to put in place. The following are the five types of remedial actions identified under phase 1 of the audit:

The Five Types of Remedial Actions

Туре	Description
1	Non-compliance issues resulting from items beyond human control or PM not relevant for this hatchery
2	Remedial actions requiring changes in agency policies or procedures
3	Remedial actions requiring changes in monitoring coverage or interval
4	Remedial actions requiring significant capital expenditures
5	Remedial actions that may require significant capital expenditures but not clearly definable at this time

Remedial Actions at Lyons Ferry Hatchery (Fall Chinook)

This section presents the corrective actions required to bring the Lyons Ferry Hatchery Fall

Chinook program into compliance with the IHOT performance measures. The remedial actions

suggested here are just that, suggestions developed by the Montgomery Watson Audit Team. For

some non-compliance areas, other remedial actions could be proposed. The required remedial

actions are cross-referenced to each IHOT performance measure that was not in compliance.

Where appropriate, the costs associated with the remedial actions are also presented (Table 2).

The cost estimates presented in this section are based on professional experience from similar

projects. In most cases, only a lump-sum figure is presented and detailed take-off lists have not

been prepared. The cost estimates are essentially order of magnitude estimates (± 40%).

More importantly, the suggested remedial activities may also present several levels of action.

Optional actions have been listed for several problems. These optional actions are desirable for

either operational or safety considerations.

Lyons Ferry Hatchery

Table 2. Remedial Actions Required at Lyons Ferry Hatchery (Fall Chinook)

Remedial Action Required	Cost	PMs¹
Type 1 - Non-compliance issues resulting from items beyond human control or PM		
not relevant for this hatchery		
Need better adult returns		4c,4g, 4h, 22a4,36
No telephone pagers in use (Not a problem because two people always on station, have alarms on station)		6
Flow and density greater than criteria - (use of lakes will prevent this problem in the future)		19,21, 30
Hauling temperatures higher than criteria		23

Remedial Action Required	Cost	PMs¹
Type 2 - Remedial actions requiring changes in agency policies or procedures		
Regional quality control officer to oversee production procedures and monitor feed quality		12
Include specific incubation standards in IHOT Operations Plan		18
Include specific rearing standards in IHOT Operations Plan		19
Measure percent smoltification		22a1
Conflict between WDFW and IHOT disinfection policies		23
Reduction of DO to 8 ppm after transport system is functioning properly		41
Develop broodstock collection plan for IHOT Operations Plan		42
Include spawning protocols in IHOT Operations Plan		43
Develop genetics monitoring and evaluation plan for IHOT Operations Plan		

Remedial Action Required	Cost	PMs¹
Type 3 - Remedial actions requiring changes in monitoring coverage or interval		
Monitor total gas pressure and dissolved oxygen (instruments only)	\$4000	5b,21, 29
Monitor chemistry parameters on routine basis	\$200/year	5c,29
Monitor contaminants on routine basis	\$400/year	5g
Type 4 - Remedial actions requiring significant capital expenditures		
Chiller for incubation	\$200,000	5a,
100 ton chiller (shipping, installation, and taxes)		22a5,36
Modification to release structure to allow removal of safety rack	\$10,000	9
Type 5 - Remedial actions that may require significant capital expenditures but not		
clearly definable at this time		
None		

Hatchery Contribution to

Fisheries, Spawning Grounds and Hatcheries

This section presents the audit findings for the Lyons Ferry HatcheryÕs Fall Chinook contribution of adult fish to fisheries, spawning grounds, and hatcheries. Data is reported by broodyear. A broodyear refers to the adult contribution from the eggs produced from a single group of spawning adults. For some species, this may include fish caught as 2, 3, 4, 5, and 6-year old fish. Because of the return distribution and data processing delays, the complete adult contribution for a given broodyear may not be available until 4-5 years after the fish have been released from the hatchery.

Table 3. Adult Contribution to Fisheries, Spawning Grounds, and Hatcheries
Lyons Ferry Hatchery (Fall Chinook)

Year	Fisheries	Spawning Grounds ³	Hatchery ³	Smolt to Adult Survival (percent)
	(Broodyear)	(Broodyear)	(Broodyear)	
1981				
4000				
1982				

Data obtained from Missing Production Groups Annual Reports or from the Regional Mark Information System database.

1984	5,400	 1,027	0.65
1985	6,108	 1,142	0.58
1986	5,711	 1,610	0.83
1987	2,057	 526	0.32
1988	4,594	 1,516	0.62
1989	382	 110	0.098
1990	489	 413	0.10
1991			
1992			

Annual Operating Expenditures

The level and detail of annual operating expenditures varies widely depending on hatchery, operating agency, and funding source. When provided, expenditures were presented in terms of personnel costs, operating costs (power, feed, supplies), capital costs, indirect costs charged to the Federal government, third-party costs, and other costs. These cost components were summed to determine a total hatchery annual cost. Based on discussion with the hatchery manager, the percent of total hatchery costs allocated to a given program were estimated. The total hatchery costs and the percent of hatchery costs allocated to a given program were used to compute the cost of a given program. Table 4 shows the annual operating expenses for the Lyons Ferry Hatchery (Fall Chinook).

Table 4. Annual Operating Expenses - Lyons Ferry Hatchery (Fall Chinook)

Component	1994	1995	1996
Personnel Costs			
Operational Costs ⁴			
Capital Costs⁴			
Indirect Costs ⁴			

The levels of detail for expense information was expanded after the Phase 1 data collection process was completed. This table will be updated at the completion of Phase 2.

Lumped Hatchery Costs	\$1,970,244	\$1,761,325	\$2,194,283
Lumped Third Party Costs			
Total Hatchery Costs	\$1,970,244	\$1,761,325	\$2,194,283
Source of Funds			
COE	100%	100%	100%
Program Production (lb)	58,212	44,746	
Total Production (lb)	437,793	373,756	
Program as Percent of Total	13%	12%	12
Program Costs	\$261,977	\$210,866	\$263,314

PMs are Performance Measures that were extracted from the IHOT 1995 report. The IHOT Performance Measures are listed in Table 1 in Section 3 in numerical order.

When it was not possible to obtain a detailed cost breakdown from an agency or third party, the undivided costs were entered here.

Does not include unspent capital budget for 1994 and 1995; includes costs for Lyons Ferry Hatchery, Tucannon Hatchery, and the satellite facilities.

Assumed value based on expenditures for past year.